

# Vegetation Zones of the Earth

ONE OF A SERIES OF  
PAMPHLETS ON

## Important Topics in Geography

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## NOTE

This pamphlet is the third of a series in preparation by the writer dealing with important topics in geography which can not receive adequate treatment in the usual text books because of the limited space which must necessarily be given to them.

The first pamphlet of the series deals with the topic, *General Circulation of the Atmosphere*; the second treats of the *Rainfall of the Earth*; this one gives a brief geographical description of the *Vegetation Zones of the Earth*. A fourth pamphlet of the series on *Population of the Earth* is in preparation.

These pamphlets are written with the express purpose of making them helpful to pupils in the geography classes of the grammar grades, and to the pupils studying physical and commercial geography in the high school.

The pamphlets are intended as a help to, not a substitute for, the regular text book work. They aim to state certain principles of geography so simply and so comprehensively that the study of the pamphlets will enable the pupil better to see the broad relationships existing in geography. These will be found especially valuable in the study of the world, or any continent, as a whole.

This pamphlet classifies the vegetation zones, gives the characteristics of each, their geographical distribution, and their value to man.

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## VEGETATION ZONES OF THE EARTH

*Introduction.* The vegetation of the earth depends so largely on the rainfall of the earth, and therefore on the wind belts of the earth, that one must keep in mind the general location and annual shifting of the wind belts and the causes and distribution of rainfall in order to understand the vegetation of the earth and its distribution in the different continents. The two pamphlets, *General Circulation of the Atmosphere* and *Rainfall of the Earth*, should be studied before this one on *Vegetation Zones of the Earth*.

To know the wind belts, rainfall, and vegetation of the earth, a continent, or a region, gives us an understanding of the conditions under which the people live. This knowledge enables us better to understand the descriptions we read in our text books and books of travel.

*A bird's-eye view of the world.* If we could ascend some distance above the earth's surface in a balloon, or in a flying machine, and travel swiftly around the earth in many directions, we should easily see that the surface of the earth is covered by great stretches of ocean and of land. The ocean area would appear about three times as great as the land area. That is, three-fourths of the *surface* of the earth is water, and one-fourth of its *surface* is dry land.

If we should now bring our air-ship somewhat nearer the earth, and move not quite so swiftly over

the land areas, or continents, we would find large stretches of the land surface presenting a uniform appearance, but very different from other broad areas of land in other regions.

If we think of the earth in its natural state, before changed by the hand of man, we would see from our air-ship three kinds of regions, each determined by the nature of its vegetation. These are *desert*, *grassland*, *forest*.

From our height, each of these vegetation regions would have quite a uniform appearance. Spots and strips of abundant vegetation might be seen in the desert. Narrow belts of forest might skirt the banks of the streams flowing across the grasslands. Open spaces covered with grasses might be seen in the forest tracts. All these, however, would appear to us, as we see them from our swiftly moving air-ship, only as small patches and narrow lines on the otherwise uniform area of vegetation.

The entire land surface, therefore, can be classified, in its natural condition, as *desert*, *grassland*, *forest*. All farmlands have been developed from one or the other of these vegetation regions. Farms yielding bountiful crops are to be found in each of these areas of natural vegetation. The forests have been cleared away and the lands planted in crops of many kinds. The grasslands have been plowed and turned into farms with much less labor than the forest areas. The deserts have been supplied with water by the construction of dams and ditches, and crops of surprising abundance and excellence have

been harvested. It is well for us to learn something of these great regions of natural vegetation, and then see how man has made use of them to his own advantage.

*Conditions necessary for plant growth.* All plants require *heat, moisture, soil*. If any one is lacking, there can be no plant life. If all three were present in exactly the same combination in all parts of the earth, the earth's surface would be uniform in its vegetation. A difference in vegetation is brought about by differences in these three factors in different regions.

While soils differ very greatly from each other, soil of some kind and of sufficient fertility to support abundant vegetation of some sort, if the proper conditions of heat and moisture are present, is found in nearly all parts of the world. An entire lack of vegetation in any region is hardly ever due to the kind of soil.

Heat and moisture are conditions of climate. The amount and distribution of heat and moisture throughout the year determine whether a region shall have vegetation or not.

*Note.* Examine your geography text book for a vegetation map of the world. Make use of it during the study of this pamphlet. A good vegetation map is found in Longmans' Atlas, map 7. This atlas should be in every school, \$1.50. Obtain through local book dealer.

1. *Deserts.* A region may have good soil and suitable temperature for growth of plants, but



yet be a *hot desert* for lack of sufficient rainfall. Such regions are the deserts of Sahara, and Kalahari in Africa; the deserts of central Asia; which are but a continuation of the Sahara, stretching from Arabia to Mongolia; the deserts of central Australia, southwestern United States and northern Mexico, and the long, narrow desert of Atacama on the west coast of South America. These *hot deserts* are not without vegetation, but the plants are few, and are especially adapted to the region. Some of the plants of the desert are the cactus, sage brush, century plant, yucca, gladiolus, tulip, dwarf pines, and junipers.

The oasis, with its rich growth of grass or abundant cultivated crops, is a spot in the desert where the roots of the plants obtain a good supply of underground water. The vegetation of an oasis is not to be considered as vegetation of the desert proper. Like the crops of our irrigated regions, the vegetation of the oasis obtains a supply of water from some source other than from the rainfall of the locality.

*Cold deserts* occur where the temperature is too cold to permit of abundant growth of vegetation. The cold desert may have no plant life at all where great sheets of ice, or glaciers, cover the earth. Most of Greenland is covered by an ice sheet. A much larger ice sheet is found around the south pole on the large land mass known as Antarctica. This *ice desert* is larger than the United States.

Where the snow and ice melts entirely during



the summer, there may be in the cold desert an abundant growth of mosses and lichens, some stunted bushes and dwarfed trees, with numerous hardy flowering plants blooming profusely during the short summer. Such a region is called the *tundra*. The tundra of Canada is known as the Barren Lands. The tundra regions of the world are found in North America and Eurasia, forming a broad belt circling the Arctic Ocean; and in the southern extremity of South America.

A *cold desert* region also exists on the tops of high mountains of all latitudes. The vegetation consists of *alpine plants*, and is of such nature as is found only at high altitudes. These plants may be rhododendrons, dwarf pines, dwarf junipers, anemones, or other herbs and shrubs.

2. *Grasslands*. Throughout the temperate and torrid zones of the earth there are great stretches of territory whose natural vegetation is the grasses. In these regions the cold is not so intense nor the rainfall so slight as to prevent a considerable development of plant life.

The region may be in the temperate zone, where there are the four well-marked seasons of spring, summer, fall, and winter. The rainfall is neither scanty nor heavy, but light or moderate,—10 to 30 inches per year. Rain or snow falls in every month of the year, with the largest amount of rainfall during the growing season of spring and early summer. The drier edge of this grassland region grades grad-

ually into the *hot desert*, and the more moist edge into the *temperate forest* lands.

These temperate grasslands are known as steppes. The North American steppes are named *prairies*. The prairies or steppes of North America form a broad belt extending from the vicinity of the Mississippi river to the Rocky mountains and from northern Mexico to the 60th parallel in Canada. East of the Mississippi most of Illinois and much of Wisconsin are in the prairie lands, while west of the Mississippi much of Missouri, and most of Arkansas and Louisiana are in the belt of temperate forests. The South American steppes are found mainly in Argentina from the vicinity of the La Plata river southward.

The Old World steppes reach their greatest development in Eurasia, where they sweep in a broad belt of unbroken extent from the plains of Hungary through Roumania, southern Russia, southern Siberia and northern China, almost to the shores of the Pacific. They are found also in northern Africa and along the Nile, forming the most fertile portions of northern Africa and the Nile valley. They exist in southern Africa, and in eastern and western Australia.

While grasses are the principal vegetation of the steppes, there are many other plants of importance. Along the stream courses there are usually belts of forest land. These provided shelter for the wild animals, and were the first regions to be occupied by the pioneer. The flowering plants of the steppes are

numerous and beautiful. Among them are the tulips, lilies, euphorbias, mints, goldenrod and many others.

In the torrid zone, and extending in some places into the equatorward edge of the temperate zones, are grasslands of somewhat different type. These regions are warm throughout the year, but there are heavy rains at one season of the year, with almost no rainfall during the rest of the year. Instead of four well-marked seasons, we have but two. These are known as the *rainy season* (summer) and *dry season* (winter).

With abundant rainfall and the warm tropical temperature, vegetation grows most rapidly. But only those plants can succeed which are able to grow, blossom, and produce seed in a short period of time. These are not trees, but grasses. These tropical grasslands are known as *savanas*. They have an abundant growth of grasses during the rainy season. In the dry season the ground is covered with a dry, straw-like covering of withered grasses.

The savanas include portions of southern Mexico and Central America, the llanos of the Orinoco, the campos of Brazil, the pampas of northern Argentina, great areas of central Africa, much of India, and portions of northern Australia. Europe is too far from the equator to have savana lands.

As in the steppes, grass is the most important, but not the only vegetation of the savanas. Where soil conditions are favorable for holding moisture throughout the year as near bodies of water, in

depressions, and elsewhere, forests may be developed more or less abundantly. Clumps of trees and even single trees are found here and there throughout most of the savana lands. They are usually stunted, gnarled, dwarfed trees. The baobab or monkey-bread tree is a large tree found growing singly over large stretches of the African savana. It requires open country for its growth and is never found in forests. Flowering plants are found on the savanas, but they are not so abundant as on the steppes and prairies.

The fact that the savana lands contain a considerable growth of trees is well shown by three vegetation maps of Africa found in three standard books. They all agree fairly well on the location and extent of the hot deserts and the dense tropical forests. There is an interesting difference, however, with reference to Central Africa lying between 20 degrees north latitude and 20 degrees south latitude, and including fully one-half of the continent. One map shows most of this region as *savanas*, another shows much of the same region as *open tropical forest*, while the third indicates the region as *grassland with woodland more or less abundantly represented*. All the map-makers endeavor to represent exactly the same thing, that is, the vegetation of central Africa. One map leads us to consider the region as mainly grassland, which it really is; the second map indicates that there is an important forest growth, which is also true; and the third map points out that grasslands are most important, but that there are regions

of abundant forests as well as more scattered tree growth.

3. *Forests.* All that portion of the land surface not included in *deserts* and *grasslands* is here classed as *forests*. The vegetation of these forest regions of the world differs greatly in different regions as to the size, appearance, kind, and amount of vegetation. The term *forest* as thus broadly used includes plants from the low, evergreen woody plants with small leathery leaves to the giant trees of the tropics intermingled with a dense and almost impenetrable undergrowth of vines and creeping plants.

The boundary between grasslands and forests is not a sharp line, but a broad belt in which one grades into the other. Even large areas are classified as grasslands on one vegetation map, and as open forest lands on another. Grasses and forests, in their natural state, are often contending for the same territory. Which shall win the victory may depend in some cases on the nature of the soil, but in most cases on the kind of climate.

A good forest climate consists of a warm growing season, a subsoil which is always moist, with damp and calm air, especially in winter. The forest will thrive whether the moisture comes from rain or from underground sources; whether the rain falls in frequent showers or not; provided the subsoil into which the roots extend is always moist.

A good grassland climate consists of a warm growing season, with frequent rains during this season so that the surface soil in which grass roots

are mainly found will be constantly moist. Along water courses, even if the annual rainfall is light, the constant seepage of the water towards the streams keeps the subsoil near the streams always moist, and trees are usually found. Farther from the streams, the frequent rains in spring and early summer keep the surface in excellent condition for the growth and development of grasses during much of the year, while the subsoil would be too dry for the growth of trees.

As we have found one kind of desert in the colder portions of the earth and another in the warmer regions; one kind of grasslands in the temperate zone and another in the torrid zone; so we shall find two kinds of forests, one in middle latitudes and another near the equator. These are the *temperate forest* and *tropical forest*.

The *temperate forest* is found ranging in latitude from Florida to Alaska; from the Mediterranean and northeastern China to regions bordering the Arctic in the northern hemisphere; and in small areas of the southern extremities of each of the three southern continents, and in New Zealand.

This broad belt of *temperate forest* in the northern hemisphere extends east-west, with irregular boundaries on its north and south edges, entirely across the continents of North America, Europe and Asia, and includes that part of Africa lying north of the Atlas mountains.

The temperate forests of northern latitudes consist of conifers, that is, cone-bearing trees, usually



evergreen. The most important conifers are the pines. Others are the hemlock, spruce, fir, cedar, and larch. Most of our soft wood lumber is obtained from these forests of pine and other conifers.

South of the conifers is an extensive forest of deciduous trees, that is, trees which shed their leaves in winter. The oak, ash, elm, hickory, and walnut are common deciduous trees. Our hardwood lumber is obtained from the deciduous forests. The great deciduous forests of the world occupied that part of the United States south of the Great Lakes and east of the Mississippi river; and all of central and western Europe. These hardwood forests have been largely cleared, and these regions now form the most important farmlands of the world.

A third kind of forest growth is found in those regions of the temperate zone which have rainy winters and very dry summers. The vegetation consists of low, evergreen woody plants with small leathery leaves. These are the regions which are occupied by the equatorward edge of the westerlies during the winter (rainy season), and by the horse latitudes and trade winds in the summer (dry season). This may be called the region of *evergreen shrubs*.

Such regions are found in both hemispheres, mainly between 30 and 40 degrees latitude, as follows:

(1) in the Mediterranean countries, including the southern peninsulas of Europe, the coasts of Asia Minor, and portions of the north coast of Africa;



- (2) in southern California, south from San Francisco, between the Pacific ocean and the mountains;
- (3) in Chili about 30 to 40 degrees south latitude;
- (4) at southwest tip of Africa in Cape Colony;
- (5) in southwestern and southern Australia.

The amount of rainfall in the temperate forests varies widely. In the latitude of the United States, we usually have grasslands if the rainfall is less than 30 inches per year, and forests if the rainfall is more than 30 inches. However, great areas of the coniferous forests of North America and Eurasia, in high latitudes, thrive where the annual rainfall is between 10 and 20 inches per year, and extensive forest areas are found in Canada and Siberia, where the rainfall is less than 10 inches.

In these northern latitudes evaporation is not so rapid, hence a larger proportion of the water remains in the soil. The subsoil at a depth of a very few feet remains frozen throughout the year, even in summer, so that the water is not lost by sinking into the soil.

The northern limit of the temperate forest is determined by the summer temperature. Trees can not grow unless they have a growing season of six or eight weeks, during which the average temperature for this period is 50 degrees Fahrenheit, or higher. For this reason, we find the northern edge of the temperate forest following quite closely the 50 degree isotherm for July. The winter temperature may be very low. The coldest region of the

earth is found in the temperate forests of northern Siberia.

The *tropical forest*. In the torrid zone where the climate is rainy throughout the year, or where the subsoil remains moist through the dry season, we have forests. The rainiest region of the earth is to be found near the equator where the doldrum belt migrates across the country bringing its heavy rains. Farther and farther from the equator the rainy season grows shorter, the dry season longer, and the forests disappear. In the dense tropical forest the trees are large, vines and climbing plants are numerous, and the traveler can find his way through the forest only with difficulty. Where the rain falls at frequent intervals throughout the year the tropical forests are green all the year. Where the dry season is of considerable length, and forests exist, the trees shed their leaves in the latter part of the dry season.

The tropical forests of North America are found south of the tropic of cancer in southern Mexico, Central America, and the West Indies. South America has a larger extent of tropical forest than any other continent. It occupies most of the Amazon basin and much of the coasts of Venezuela, the Guianas, and Brazil.

Europe is too far from the equator to have tropical forests. Southeastern Asia, the Philippines, and the East Indies support great areas of tropical forest. One map represents most of India as having been covered in its natural state with savanas, while another indicates that the savana land contained

considerable forest areas. Northern Australia contains some tropical forests. In Africa areas of dense tropical forests are found in the basins of the Niger and the Kongo, while a considerable forest growth is found among the savana lands of central Africa. The island of Madagascar contains much tropical forests.

From the tropical forests we obtain rubber; mahogany, ebony, teak, and other woods valuable for their timber; and numerous plants used for medicinal purposes.

*Study the following outline. Write it from memory:*

Vegetation Zones of the World	{	Deserts	{ 1. Cold deserts
			{ 2. Hot deserts
	{	Grasslands	{ 3. Steppes and prairies
			{ 4. Savanas
	{	Forests	{ 5. Temperate forests
			{ 6. Tropical forests

The six numbered regions we shall call the *six vegetation zones of the world*. Note that one zone of each pair is found in high latitudes and the other in low latitudes.

These six vegetation zones are well described in Herbertson's *Man and His Work*, the Macmillan Co., 60c. They are well shown in Longmans' Atlas, map 7. The atlas map shows the vegetation by 17 different colors. To simplify this representation of the map to the classification given above, make the following combinations of numbered areas as found on the map.

1. *Cold deserts*—1, 2, 3 of the atlas map.
2. *Hot deserts*—4, most of 6 (including that part of 6 surrounding 4).
3. *Steppes and prairies*—5, part of 6 (including that part of 6 on the margins of 5), 7, 8.
4. *Savanas*—15, 16.
5. *Temperate forests*—9, 10, 11, 17.
6. *Tropical forests*—12, 13, 14.

*Maps of vegetation zones.* On an outline map of the world construct a vegetation map. Use different colors or different shadings for the different vegetation zones. If your text book contains a good vegetation map of the world, it may be made the basis of this world map.

If Longmans' Atlas, map 7, is used, combine the atlas numbers as indicated above, and make a map in six colors or six shades. On the map place neatly a key to the six colors of the map. The key accompanying the Longmans' Atlas map suggests how to do this work neatly and accurately.

As each continent is taken up for special study with the advanced geography for a text book, one of the most helpful maps to be made is a vegetation map of the continent. Such a map should be constructed by each pupil on an outline map of the continent, from the vegetation map of the world in text book or Longmans' Atlas. While drawing such a map care should be taken to show accurately the limits of each vegetation zone, to note the countries and parts of countries occupied by each zone

and to consider the influence of each vegetation zone on the lives of the people who inhabit the region.

Full suggestions as to how to have pupils construct a series of maps for the study of a single continent are given in the preceding pamphlet of this series, *Rainfall of the Earth*. This series includes a vegetation map. The series consists of two maps of the world, and 10 maps of the continent.\*

*Location of vegetation zones by latitude.* Study the world vegetation maps from the books, or from the map constructed by the pupil. A good notion of the arrangement of vegetation zones in different latitudes may be had by traveling in a straight line (see world map) from the northern shore of Siberia, at 110 degrees east longitude, to the equator on the west coast of Africa, then southward near the west coast of Africa to the Cape of Good Hope. This journey carries us across Siberia, southwest Asia, a portion of the Sahara, central, and southern Africa.

We would at first cross a portion of the *cold desert*, the tundra region of Siberia, with its cold, bleak lands, barren of vegetation save for mosses, stunted shrubs, and other plants which spring into life with the long days of the short summer.

While yet within the Arctic Circle we would enter the northern edge of the *temperate forest* of Siberia, the most extensive forest in the world. We pass

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\*Publishers' Note.—Outline maps of the world and each continent especially designed for such work as the foregoing are issued by the publishers of this pamphlet, McKnight & McKnight, Normal, Illinois. The maps will be sent prepaid for 1c each, or 80c per hundred.

from the Siberian tundra into regions of stunted copses, which develop to the south into better and better woodland until we enter the vast unbroken forest of conifers. For nearly a thousand miles we may continue our journey across this great forest.

Towards the southern edge, between 50 and 55 degrees north latitude, open spaces appear, the grassland areas increase in size, and we come out upon the *steppes* of southern Russia, which are much like our *prairies* west of the Mississippi. This is a narrower belt from north to south, only a few hundred miles at most, but it stretches for 5,000 miles and more from west to east from the plains of Hungary to the plains of Manchuria. The Trans-Siberian railway traverses this great steppe land in its east-west extent, and it is becoming rapidly settled by industrious and thrifty herdsmen and farmers.

As we proceed, the rich grassy steppes change to poorer and poorer grasslands, and then pass into the *hot desert* regions of Turkestan, Persia, Arabia, and northern Africa. In this broad desert region millions of people make their homes, providing the necessities of life from their herds, which find food in the more favored spots, or from the crops of the oases and valleys, which have a very fertile soil, and which are supplied with water from underground sources, or by means of irrigation.

As we cross the 20th parallel of north latitude we come into a region of light but increasing rainfall. Grasses appear and become more abundant as we



continue on our journey. We are now in the *savanas* of central Africa. Here the heavy rains of the wet season produce abundant growth of grass and cultivated crops, while the dry season which follows dries out the soil and withers the grass. This region is known as the Sudan, and supports a larger population than any other extensive region of Africa. Grazing and farming are the chief occupations.

As we cross the savanas the scattered single trees become more and more abundant, groves and forests appear, and as we approach the equator we pass into the dense *tropical forests* of Africa with such abundant growth of trees, vines, and creeping plants as to make progress in travel exceedingly difficult.

As we continue our journey southward in the western part of Africa we cross the vegetation zones in reverse order,—from the *tropical forests* we pass into the *savanas*, *hot deserts*, *steppes*, and *temperate forests*, while, away to the south, beyond the Southern Ocean, lies the greatest *cold desert* of the world, equal in area to the continent of Europe, and not inhabited by a human being. This is the continent of Antarctica.

A study of the vegetation map of the world will show how the six vegetation zones in other continents take the same general position with reference to latitude as described above, but the direction and extent of the vegetation zones are very greatly influenced by the surface features of the continents, and the location of continents with reference to the oceans.



*Vegetation zones and wind belts.* The close relationship of vegetation zones to rainfall has already been shown. This indicates also a close relationship between vegetation zones and wind belts. We shall begin at the equator, and consider the relationship of each vegetation zone to the different wind belts which influence it.

1. The *tropical forests* are found where there is abundant rain and no very long dry season. This is near the equator, where the *doldrums* bring long rainy seasons, or on high east coasts, where the *trade winds*, as well as the *doldrums*, produce heavy rainfall, or in the *monsoon* winds, which bring sufficient moisture. The dry seasons which come with the trade winds are not of sufficient length to prevent forest growth.

2. The *savanas* are occupied alternately by the *doldrums* and *trade winds*. The *doldrums* bring the rainy season with its period of rapid growth. The trade winds bring the dry season with its drought and parched grasses.

3. The *hot deserts* lie in the *trade winds*, *horse latitudes*, and *westerlies*. Desert conditions are the natural results of the trade winds and horse latitudes. These two wind belts are responsible for most of the great desert areas of the world. The hot deserts extend into the *westerlies* if the region lies to the leeward of high mountains, or is so far removed from the oceans that moisture falls as rain before the region is reached.

4. The *steppes* and *prairies* have their best, and

their typical development in the *westerlies*. The equatorward edge of the steppes in some regions are influenced by the horse latitudes and trades during the summer.

5. The *temperate forest* is almost wholly in the *westerlies*. The regions of the temperate forests described as *evergreen shrub*, lie in the *westerlies* in the winter, when they have their wet season; and in the horse latitudes and trades in the summer, when they have their dry season.

6. The *cold desert*, except the alpine region, lies wholly in the poleward edge of the *westerlies*, mainly within the polar circles. The *alpine region* of mountains is found in all latitudes, therefore in all wind belts.

*Man's use of the vegetation zones.* All people live in one or the other of these six natural vegetation zones, and all the six vegetation zones have people living in them. Some of the vegetation zones are poorly adapted to support human life, while others are capable of supporting a very dense population.

Food, clothing, and shelter are often spoken of as the necessities of life. This means that human life can not be supported in a region unless the region furnishes materials for food, clothing, and shelter. In some tropical regions little or no clothing is necessary, and shelter may be of the most primitive kind. For most of the people of the world, however, clothing and shelter are very necessary. Food is essential to all people in all places. The density of population

of any region depends very largely on its ability to furnish the materials necessary for food, clothing, and shelter.

The deserts support only a very sparse population. No human being makes his home on the great areas of the cold desert continually covered with ice. The great ice sheet around the south pole, and that of Greenland, has no inhabitants. Greenland has an area about equal to that part of the United States lying east of the Mississippi river, but only 12,000 people live in Greenland. These live on the margins of the land not covered by the ice sheet, and obtain their living from the sea.

That part of the cold desert known as the tundra, or barren lands, is very sparsely populated by wandering tribes who gain a livelihood by hunting, fishing, or keeping herds of reindeer. The entire cold desert of the world probably does not contain so many people as are found in a single one of the well-developed agricultural states of the United States.

The hot desert regions of the world contain many more people than the cold deserts. They do not obtain their food, clothing, and shelter, however, from the desert proper. The scattered steppe lands in favorable localities, the fertile oases, and the irrigated valleys are the productive regions. Employment is also furnished in carrying commercial products to and from these settled regions, and also entirely across the desert.

Arabia has an area equal to that of the United

States east of the Mississippi, with a population less than one-half that of New Jersey. On a vegetation map Persia, Afghanistan, and Baluchistan are shown as desert or semi-desert over their entire extent. The three countries together are equal in size to one-third the United States, and contain a population almost three times as great as that of the New England States. One-third of the United States, most desert-like in character, contains fewer people than *any one* of the states of New York, Pennsylvania, Illinois, or Ohio.

The grasslands of the world vary widely in their ability to support a population. Poor steppe land is only somewhat better than desert land, and not to be compared in value with the fertile oases and rich irrigated lands scattered throughout the desert lands of the world. The better steppe lands support large herds and an important population. The best steppe lands, such as the black earth region of southern Russia, and the eastern prairie lands of North America, are suitable for cultivation, and furnish great areas of the richest farmland of the world, supporting a dense population.

The savana lands, like the steppes, vary from poor to very excellent lands for human occupation. The savanas of the Sudan support the densest negro population of Africa.

Forest lands, just as grasslands, may be very good or very poor for human life. In their natural state they are occupied by hunting and fishing tribes. Only a sparse population of hunting tribes can find

support in any region. The coniferous forests grow usually in high latitudes, and occupy great areas of poor, sandy soil. Even when cleared, these coniferous forest regions may be worthless for agriculture, and, therefore, for human occupation. Large areas of coniferous forest on good soil and in good climate for agriculture have been cleared, and now support many people. Much of the British Isles was covered with conifers.

The soil, heat, and rainfall necessary to the development of deciduous forests are very favorable to the growth of the important agricultural crops. The great deciduous forests of central and western Europe, and of eastern United States have been largely cleared away to give place to fertile and productive farms, large cities, numerous transportation lines, and all that goes to make progressive, thrifty nations, with large populations.

The great populations of China, Japan, and India are supported on areas originally covered by temperate or tropical forests, steppes or savanas.

The *dense* tropical forests support a very sparse population. The hunting tribes can not thrive in large numbers. The labor of clearing the forest is too great to be carried on to advantage in such a warm, moist climate. Cleared land rapidly returns to forest unless kept clear by constant effort.

By far the larger part of the total population of the world (1,500,000,000) lives on land originally occupied by rich *steppe* or *savana*, or by *deciduous* forest, or a moderate growth of *tropical* forest.

These well-populated regions occupy only a small fraction of the land surface of the earth. Study a population map of the earth. See Longmans' Atlas, map 8.

*Pictures.* Your text books and reference books will furnish many pictures illustrating the vegetation zones of the earth.

The best pictures for use in this study are to be found in the "600 set" of stereographs and lantern slides published by the Keystone View Co., Meadville, Pa.

The following numbers from the "600 set" show vividly the vegetation zones, both in their natural state, and under human occupation. The numbers refer to the serial numbers of the "600 set":

I. Cold deserts. 175, 176, 221, 222, 223, 224, 225, 256, 257, 258, 356, 421, 423, 424, 425, 433, 434.

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*Note.* A complete catalog of the "600 set" of stereographs and lantern slides will be sent free on request by Keystone View Co., Meadville, Pa. The catalog contains directions for the use of pictures, very helpful to teachers.

## TOPICAL ANALYSIS

### VEGETATION ZONES OF THE EARTH

- I. Introduction.
- II. A bird's-eye view of the world.
  1. Areas of land and water.
  2. Areas of vegetation on the land.
    - a. Desert.
    - b. Grassland.
    - c. Forest.
- III. Conditions necessary for plant growth.
  1. Heat.
  2. Moisture.
  3. Soil.
- IV. The vegetation zones.
  1. Deserts.
    - a. Hot deserts.
    - b. Cold deserts.



- 2. Grasslands.
    - a. Steppes and prairies.
    - b. Savanas.
  - 3. Forests.
    - a. Temperate forests.
    - b. Tropical forests.
  - V. Outline to be memorized.
  - VI. Maps of vegetation zones.
  - VII. Location of vegetation zones by latitude.
  - VIII. Vegetation zones and wind belts.
  - IX. Man's use of the vegetation zones.
  - X. Pictures.
- 

*Note to the Teacher.*—After the pamphlet has been carefully studied, and the pupils have discovered in the text the general outline as given above, a strong review lesson may be had by asking pupils to expand the Topical Analysis as here given into a much more detailed analysis in which the important sub-topics shall be shown under each of the main topics.

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